

“Diseased” minerals: microbial degradation of copper sulfide museum specimens

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Museum specimens of copper sulfide, notably chalcocite and bornite, sometimes develop brown, powdery coatings that degrade their aesthetic quality. Such specimens are typically stored in dry cabinets or drawers in ambient humidity and temperature. The brown coatings examined by scanning electron microscopy (SEM), exhibit an abundance of micrometer-sized, arborescent copper oxide (Fig. 1).

Several afflicted specimens were provided by the Harvard Mineralogical Museum in 2001, from which the brown coating was used to inoculate enrichment cultures on growth media containing various copper sulfides. The cultures responded slowly but after several years developed visible growth of blue-green or brown to black colonies that precipitate brilliant blue and green copper oxide minerals. Samples from the cultures were collected for 16s ribosomal DNA analysis and examination by SEM and electron microprobe.

Microorganism growth on copper sulfides may be enhanced by the level of humidity in certain regions. In this case, specimens stored in Boston, on the eastern seaboard of the US, exhibit the powdery coating while specimens from museums in arid climates such as New Mexico do not. It is possible that handling the specimens provides a small amount of organic skin oil that may feed some of the organisms.

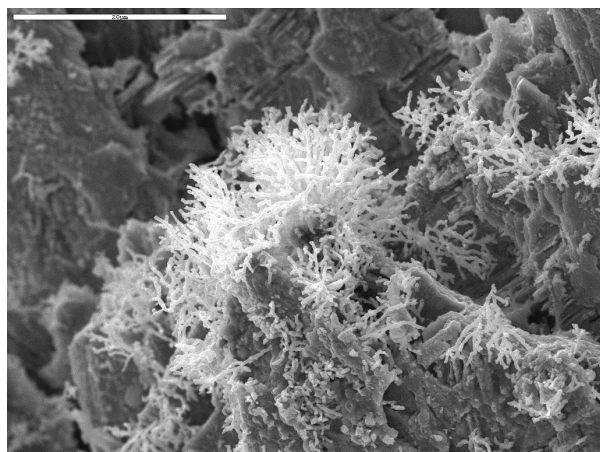


Figure 1: Surface of chalcocite specimen stored in a mineral cabinet at the Harvard Mineralogical Museum, Boston, Massachusetts.